United States Department of the Interior

GEOLOGICAL SURVEY
P. O. Box 69
Albuquerque, New Mexico 87103

Mine Examination Report
Todilto Exploration and Development Corporation
Haystack Mine
Navajo Allotted Uranium Lease
NOO-C-14-20-8396
Section 18, Township 13 North, Range 10 West, N.M.P.M.
McKinley County, New Mexico
April 20, 1981

David Sitzler, Mining Engineer, and I inspected the captioned mining operation April 16, 1981. We discussed the mining activities with Mr. Tom Roman, Mine Foreman, and examined the underground workings with Mr. Toren Olsen, Mine Geologist. The purpose of the inspection was the examination of the mining performed, and this was the first inspection since the operations were approved in September 1980.

For several years, Todilto Exploration and Development Corp., has operated the Haystack Mine in Section 13, T. 13 N., R. 11 W., and Section 19, T. 13 N., R. 10 W. Both open-pit and underground mining methods have been used, but present activities are confined to underground workings in Section 13. This mining has been performed under mineral leasing agreements between TEDCO, the Department of Energy, and the Santa Fe Railroad Company. The surface rights for these tracts are reserved for the Navajo Indian Tribe by PLO 2178.

TEDCO obtained Navajo Allotted Uranium Lease NOO-C-14-20-8396 for the SW/4, Section 18, T. 13 N., R. 10 W., through direct negotiation with the allottee. The lease was issued March 24, 1980, and shortly thereafter, TEDCO requested approval of both an exploration plan and an interim mining plan for the leasehold. The exploration plan provided for the surface drilling and probing of as many as 1,165 boreholes, and it was approved June 23, 1980. TEDCO has now completed about 330 boreholes within the lease. The interim mining plan provided for limited extension of the underground mining in adjacent Section 13 into lease -8396, to explore and develop the projected ore trend. All required equipment, personnel, and surface facilities were to be provided by the Section 13 operations. The plan was conditionally approved September 23, 1980.

Lease -8396 lies at the base of Haystack Mountain, a mesa elongated in an east-west direction. Elevations range from 7,833 feet at the top of Haystack Mountain to about 7,000 feet toward the southeast corner of the lease. Surface drainages are small intermittent arroyos that flow southwest and southeast only during periods of excessive precipitation.

The climate of the area is semi-arid. The average annual precipitation of about 12 inches occurs mostly as rain in July and August. The annual

snowfall approximates 17 inches. Sunshine is abundant, and the relative humidity is characteristically low. The prevailing wind direction normally parallels the valleys and the average annual wind velocity is about 10 mph.

The Lease lies in a transition zone containing pinyon-juniper woodland and grassland. The woodland species are restricted primarily to the escarpments and higher elevations while the sparse grasses occur on the lower slopes and hills. Wildlife species in the area are restricted to birds, reptiles, and small mammals characteristic of pinyon-juniper and grassland habitats.

Vehicular access in the area is provided by improved and unimproved dirt roads that lead primarily to paved State Highway 53 to the east, and U. S. Highway 66 to the west. The land in and around the Lease is used primarily for residences and the grazing of livestock, mostly sheep and goats. Numerous open-pit and underground uranium mines operated in and around the Lease between 1950 and 1972; underground mining within the Lease itself produced approximately 25,000 tons of ore averaging 0.15 - 0.19 percent U_3O_8 during this time period. The prolific Ambrosia Lake uranium mining area is about 10 - 20 miles to the east.

The uranium host in the Haystack Mine is the Todilto Limestone Member of the Upper Jurassic San Rafael Group. The Todilto ranges in thickness from 0 to 85 feet, bounded by the lower Entrada Sandstone Member and intertonguing with the Upper Summerville Sandstone Member. Generally, uranium mineralization in the Todilto Limestone occurs as flat, tabular deposits with irregular outlines in the top portion of the Member. Ore thickness rarely exceeds one to three feet, and grade varies widely, tending to be higher in the center of the deposits. Some of the ore deposits are quite uniform while others are erratic, small pods. Average depth to the ore within Lease -8396 is 100 to 120 feet. Mr. Roman noted that the high-grade ore (four and ten-foot thicknesses of about 0.14 - 0.15 percent U_3O_8) indicated by two exploration boreholes, was encountered in the mine workings. The ore occurred in two small anticlinal folds, and both zones were only about four to five feet wide.

The Haystack Mine operates two 8-hour shifts per day, five days per week, with a total workforce of 17 people. Ore production averages about 2,000 tons per month. The mining cutoff grade is 0.10 percent U_3O_8, but ore as low as 0.05 percent U_3O_8 will be recovered if broken. At the time of this inspection, the mining operations in Lease -8396 had been stopped. The ore encountered in the Lease was very spotty, and the 1,900 tons mined averaged only about 0.09 percent U_3O_8. This low grade, coupled with the declining price of uranium, made the operations in the Lease uneconomical. When the operations were active, four miners worked in the Lease two shifts per day, five days per week. Mr. Roman noted that all but 50 - 60 of the 1,900 tons mined had been shipped to the mill. He does not anticipate re-entering the Lease until the price of uranium is back up to at least $30 per pound.

Access to the Haystack Mine is provided by the West Portal in Section 13. From this Portal, the 9-foot high by 11-foot wide 1200 Haulage Drift heads easterly to provide the main passageway to the underground workings for mining equipment and personnel, compressed air and water pipes, electrical lines, and exhaust ventilation. The Haystack Section 13 workings branch off the 1200 Haulage Drift to the north and south about 600 feet east of the West Portal. Fresh intake ventilation air for the Mine is provided by a 4-foot square vent raise driven on a 45° angle to the surface about 1000 feet east of the West Portal, and two 18-inch vent holes drilled vertically from the surface about 1400 feet east of the Portal. Both of these downcast ventilation entries are equipped with electric fans at their intersections with the 1200 Haulage Drift. Access into Lease 8396 was provided by extending the 1200 Haulage Drift east into the Lease about 85 feet, and fresh air was routed into the workings by flexible ventilation tubing in the Drift. When active, approximately 30,000 cfm of fresh air were routed into the workings in Lease -8396.

Due to the thin nature of the ore in the Todilto Limestone, TEDCO uses modified room-and-pillar mining on retreat with split shooting in both development and pillar extraction. Generally, 8-foot square development drifts and crosscuts are driven east-west and north-south respectively, to develop rectangular development blocks approximately 50 by 90 feet. Development blocks containing ore are then split by east-west crosscuts seven feet high by ten feet wide into rectangular ore pillars about 20 by 50 feet. After development is complete, the ore pillars are extracted by slabbing the pillars into the development drifts and crosscuts on retreat from the ore zones toward the 1200 Haulage Drift. Both development and pillar extraction are conducted using conventional drilling and blasting with pneumatic jackleg drills and diesel-powered, rubber-tired LHD's and haulage trucks. Ground support is minimal with the natural pillar supports being supplemented by split-set rock bolts with wire mesh, headboards, or steel mats, and timber stulls and/or cribbing as necessary.

Since the uranium ore in the upper portion of the Todilto Limestone is very thin, split shooting is used to carefully control ore dilution during both pillar development and extraction. In pillar development, all drifts and crosscuts are driven so that the ore zone is located in the upper portions of the entry cross-sections. Each round is probed by a geologist, and the ore zone is marked on each face with paint. The lower portion of each round, or the waste, is shot out from under the ore first and mucked out. The ore, or upper portion of each round, is then popped down and trammed to the surface. The same procedure is used in pillar extraction and actually constitutes hand sorting of the ore for close grade control.

Ore trammed to the surface is placed on one of three stockpiles according to grade (0.04 - 0.07 percent U_3O_8, 0.071 -0.10 percent U_3O_8, and 0.101 percent U_3O_8 and above). Muck probing less than 0.04 percent U_3O_8 is considered waste and is gobbed into abandoned workings or placed on the

dump near the West Portal. The ore in the surface stockpiles is blended to produce the most economic grade for shipping, and then transported to the United Nuclear-Homestake Partners' Mill at Ambrosia Lake. This is the only facility in New Mexico capable of milling limestone ore, and TEDCO sells only the crude ore to either United Nuclear Corporation or Homestake Mining Company. The buyer tolls the ore through the partnership mill and sells the concentrate produced.

No violations of the lease terms, interim mining plan, or Federal regulations were observed during this inspection. The 1200 Haulage Drift was extended east into Lease -8396 about 85 feet (see enclosed map). Pillar development, as described above, was then extended about 160 feet to the north, and 320 feet to the south. In the north, development extended about 90 feet east, and development in the south was driven about 120 feet east. A second east-west connection with the Haystack Section 13 workings was made 120 feet south of the 1200 Haulage Drift. This development is within the limits set in the approvals of the intermin mining plan and subsequent modifications. Also, as specified in those approvals, no pillar extraction was conducted, and the boundaries of Lease -8396 were adequately marked in the two drifts connecting the mine workings. Ore from the Lease has been segregated from the other Haystack ore; however, due to the low grade of the ore, only two stockpiles are being used (0.05 - 0.099 percent U_3O_8 and 0.10 percent U_3O_8 and above). Monthly ore production has been reported to this office, and correct royalties have been paid on the first lot of ore shipped to the mill (Lot 9449-495.56 dry tons). No waste dumps, ore stockpiles, or other surface facilities have been placed on the surface of the Lease, and no complaints about the mining operations have been submitted to this office. As previously noted, the mining operations within the Lease have been stopped due to poor economic conditions.

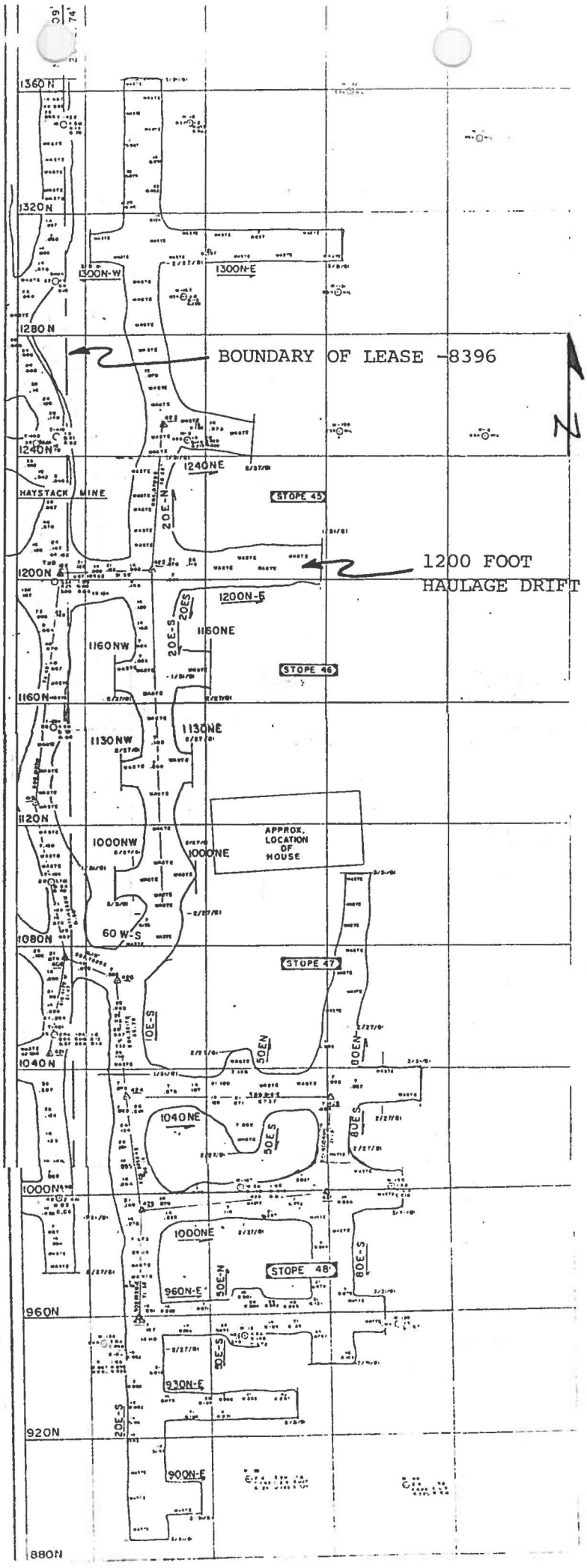
After the mine inspection, we briefly examined the abandonment of the exploration boreholes in Lease -8396. It appears that TEDCO has plugged all of the boreholes, but considerable reclamation (contouring, grading, and seeding) must be performed before abandonment is complete. TEDCO has done a very good job of plugging and marking the boreholes. No drilling operations were in progress at the time.

Dale C. Jones
District Mining Supervisor

Enclosure

APR 24 1981

ASSISTANT DIRECTOR (Ops.)


1360N
1320N
1300N-W
1300N-E
1280N
BOUNDARY OF LEASE -8396
N
1240N
1240NE
HAYSTACK MINE
STOPE 45
20E-N
1200N
1200 FOOT
HAULAGE DRIFT
1200N-S
20E-S
1160NE
1160NW
STOPE 46
1160N
1130NE
1130NW
1120N
APPROX.
LOCATION
OF
HOUSE
1000NW
1000NE
60 W-S
1080N
STOPE 47
10E-S
50EN
100EN
1040N
1040NE
50E S
80E-S
1000N
1000NE
STOPE 48
960N-E
50E-N
80E-S
960N
50E-S
930N-E
920N
20E-S
900N-E
880N